



SNS COLLEGE OF TECHNOLOGY

AN AUTONOMOUS INSTITUTION

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UGC

DEPARTMENT OF FOOD TECHNOLOGY

COURSE CODE & NAME: 19FTT301 & Refrigeration & Cold Chain
Management

III YEAR / V SEMESTER

UNIT : I INTRODUCTION TO REFRIGERATION

TOPIC 1 : Ozone Depletion Potential



Ozone Depletion Potential (ODP)

- **Ozone Depletion Potential**, is the potential for a single molecule of the refrigerant to destroy the Ozone Layer. All of the refrigerants use R11 as a calibration and thus R11 has an ODP of 1 .
- The *less the value of the* ODP the better the refrigerant is for the Ozone Layer and the Environment.
- Ozone Depletion Potential (ODP) of a chemical compound is the relative amount of degradation it can cause to the ozone layer



Ozone Depletion Potential



- Ozone is an isotope of oxygen with three atoms instead of normal two. It is naturally occurring gas which is created by high energy radiation from the Sun.
- The greatest concentration of ozone are found from 12 km to 50 km above the earth forming a layer in the stratosphere which is called the ozone layer.
- This layer, which forms a semi-permeable blanket, protects the earth by reducing the intensity of harmful ultra-violet (UV) radiation from the sun.



Refrigerant	Ozone Depletion Potential (<i>ODP</i>)	Global Warming Potential (<i>GWP</i>)
R-11 Trichlorofluoromethane	1.0	4000
R-113 Trichlorotrifluoroethane	0.8	4800
R-114 Dichlorotetrafluoroethane	1.0	3.9
R-12 Dichlorodifluoromethane	1.0	2400
R-123 Dichlorotrifluoroethane	0.02	0.02
R-124 Chlorotetrafluoroethane	0.02	620
R-125 Pentafluoroethane	0	3400
R-13 B1 Bromotrifluoromethane	10	
R-134a Tetrafluoroethane	0	1300
R-143a Trifluoroethane	0	4300
R-152a Difluoroethane	0	120
R-22 Chlorodifluoromethane	0.05	1700
R-245a Pentafluoropropane	0	
R-32 Difluoromethane	0	650
R-401A (53% R-22, 34% R-124, 13% R-152a)	0.037	1100
R-401B (61% R-22, 28% R-124, 11% R-152a)	0.04	1200
R-402A (38% R-22, 60% R-125, 2% R-290)	0.02	2600
R-404A (44% R-125, 52% R-143a, R-134a)	0	3300
R-407A (20% R-32, 40% R-125, 40% R-134a)	0	2000
R-407C (23% R-32, 25% R-125, 52% R-134a)	0	1600
R-502 (48.8% R-22, 51.2% R-115)	0.283	4.1
R-507 (45% R-125, 55% R-143)	0	3300
R-717 Ammonia - NH ₃	0	0
R-718 Water - H ₂ O	0	
R-729 Air	0	
R-744 Carbon Dioxide - CO ₂		1*



Ozone Depletion Potential



Harmful consequences of ozone depletion

- For Humans Increase in • skin cancer • snow blindness • cataracts
- Less immunity to • infectious diseases • malaria
- For plants • smaller size • lower yield • increased toxicity • altered form
- For marine life • Reduced • plankton • juvenile fish • larval crabs and shrimps



Important Refrigerants:

Properties at -15°C

(1) Ammonia (NH_3)(R-717)

Latent heat = 1312.75 kJ/Kg

Specific volume = $0.509 \text{ m}^3/\text{kg}$

(2) Dichloro–Difluoro methane (Freon–12) (R-12) [$\text{C Cl}_2 \text{ F}_2$]

Latent heat = 162 kJ/Kg

Specific volume = $0.093 \text{ m}^3/\text{kg}$

(3) Difluoro monochloro methane – or Freon-22 (R-22) [CH Cl F_2]

Latent heat = 131 kJ/Kg

Specific Volume = $0.15 \text{ m}^3/\text{kg}$.



Global Warming Potential

- **Global Warming Potential** , is a measurement of how much effect the given refrigerant will have on Global Warming in relation to Carbon Dioxide. This is usually measured over a one hundred year period. In this case the *lower the value of GWP* the better the refrigerant is for the environment.
- **GWP** is a relative scale which compares the amount of heat trapped by greenhouse gas to the amount of heat trapped in the same mass of Carbon Dioxide.



THANK YOU..."